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ABSTRACT

This study was concerned specifically with the performance of soldiers on Skill Qualification Tests (SQT) in relation to the readability of the tests. The paper also touches upon the effects of soldiers' motivation and training on SQT performance. Regarding readability, the study was designed to address three questions: does the readability of SQT match that of the target soldier population; to what extent is reading ability a factor in the SQT performance of soldiers; and to what extent is the association between reading ability and SQT performace modified by other factors, specifically soldier motivation? Results of an analysis of ten SQT and related data showed: the readability of the ten SQT included in this study match the reading ability in the target soldier population; (2) soldier reading ability and SQT readability are important factors in SQT performance, as evidenced by reviews of SQT by outside experts, and soldier responses indicating difficulty in understanding the skill component of the SQT; (3) soldier motivation as expressed in military career intentions, and opinions about the importance of the SQT was not related to SQT scores; (4) emphasis on the SQT as reflected in the early delivery of the SQT Notice and training of soldiers was related to SQT scores; and (5) findings are negative concerning the association between soldier reading ability and SQT performance, as the association might be modified by other factors. (Author/GK)

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READING, READABILITY, MOTIVATION AND TEST VALIDITY

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Reading Ability, Readability, Motivation and Test Validity

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This study was concerned specifically with the performance of soldiers on Skill Qualification Tests (SQT) in relation to the readability of the tests. More generally, the paper also touches upon the effects of soldiers' motivation and training on SQT performance.

First, we will comment briefly about the makeup and scoring of SQT. Skill Qualification Tests are made up of the following parts, or components: the Job Site Component (or JSC), the Hands-On Component (or HOC), and the Skill Component (or SC).

The Job Site Component (JSC) is not a test in the conventional sense. Rather, supervisors rate soldiers on their ability to perform certain tasks. The Hands-On Component (HOC), as the name implies, is made up of performance tests. Soldiers perform certain tasks under a set of standard conditions and their performance is scored according to clearly specified criteria. The Skill Component (SC), as the name does <u>not</u> imply, is a multiple-choice test. The SQT score is an aggregate of the component scores. The written portion of the SQT (the Skill Componert) is the major source of variance in SQT scores; and, of course, this is the component where the problem of readability arises.

One of the major concerns about printed multiple-choice tests of occupational competence is that the test may require reading ability in excess of that required by the job itself. If an SQT requires reading skills which are excessive in relation to the reading abilities of soldiers and the demands of the MOS, then there obviously are serious implications for test validity.

Soldiers with limited reading skills may not be able to achieve test scores which are commensurate with their MOS competence.

Major Questions and Methodology

With respect to readability, the study was designed to address three questions as follows:

(1) Does the readability of SQT match the readability in the target soldier population?

(2) To what extent is reading ability a factor in the SQT performance of soldiers?

(3) To what extent is the association between reading ability and SQT performance modified by other factors, specifically soldier motivation?

These questions were addressed here through analysis of ten SQT and data relating thereto. The SQT were all skill level one tests. Skill level one is the lowest of the five skill levels in the Army MOS structure. The SQT were drawn from the ten MOS shown in Table 1. The first five MOS listed here are Combat Arms MOS. The latter five are Support MOS (i.e., Combat Support/Combat Service Support). This mix of MOS was by design.

(Table 1 About Here)

As part of a larger study, data for use in evaluating these ten SQT were collected from skill level one soldiers who had taken the SQT, and from their supervisors. The SQT also were reviewed by specialists from the civilian testing community. The paper draws upon data provided by the field research and the expert reviews of the SQT.

Match Between SQT Readability and Soldier Reading Ability

The readability of the SQT, expressed as a reading grade level (RGL), was estimated through application of the Flesch-Kincaid reading ease formula which

uses sentence length and word length to estimate the readability of prose materials (Kincaid & Fishburne, 1977).

The reading ability of soldiers, also expressed as a reading grade level (RGL), was estimated from AFQT scores. The average reading ability in each MOS population was estimated using a conversion scale based upon correlations of AFQT scores with scores on the Nelson-Denny Reading Test and the Gates-MacGinitie Reading Test. This conversion scale was developed by the Air Force Human Resources Laboratory (Mathews, Valentine & Sellman, 1978). Estimates of the RGL of each SQT and the RGL of the soldier population for which the SQT was intended are shown in Table 2. These estimates indicate consistent matches between SQT readability and soldier reading ability. The average RGL of the SQT generally is below the average RGL of the soldier population. The only exception to this match of SQT/RGL and soldier/RGL is the SQT for MOS 55B.

(Table 2 About Here)

The conclusion indicated here is that readability is not a major source of invalidity in the SQT. The conclusion also is consistent with data from the interviews of noncommissioned officers.

When asked for their opinions as to the major reasons why soldiers fail SQT, NCO's only infrequently mentioned reading ability.

Reading Ability as a Factor in SQT Performance

It should not be concluded, however, that reading ability is unimportant in SQT performance. A questionnaire which was completed by soldiers included the item "I have difficulty understanding the written portion of my SQT." Soldiers responded by checking one of the following: never, seldom, sometimes, usually, or always. The percentage of soldiers in each MOS who responded with "sometimes," "usually" or "always" is shown in Table 3. There is a substantial proportion of soldiers who reported difficulty in understanding the skill component.

(Table 3 About Here)

Soldier responses to the item "I have difficulty understanding the written portion of my SQT" were quantified and correlated with SQT scores. The correlations, while not all statistically significant, were all negative. Finally, we computed correlations between AFQT scores and SQT scores and regarded these correlations as estimates of the contribution of reading ability to SQT variance. The correlations are shown in Table 4.

(Table 4 About Here)

It is pertinent to note here that on each SQT, the reviewers found items which were complex and unnecessarily difficult in wording. In a number of instances, these items were answered correctly by even fewer soldiers than would be expected on the basis of chance.

The conclusion, stated above, that readability of the test is not a serious problem must then be qualified. Readability of the test and reading ability of soldiers clearly are factors in SQT performance.

Effects of Soldier Motivation

We now wish to address the third question: to what extent is the association between reading ability and SQT performance modified by other factors, especially soldier motivation?

(Figure 1 About Here)

The question stems from a simple model of reader performance (Klare, 1973), shown in Figure 1. It says, in effect, the reader's performance depends upon the interaction of three factors: the reader's level of competence, the readability of the materials, and the level of reader's motivation. Thus, a highly motivated soldier might effectively deal with materials at a level of readability that the less well motivated soldier of comparable reading ability could not deal with effectively. This was an area which we wished to explore.

As a means of assessing motivation, soldiers responded to the following questions:

How important is to you to get a good score on your SQT?

How important do you feel the SQT is for promotion?

Do you intend to make the Army a career?

Would you recommend your MOS to someone considering a career in the Army?

It was expected that soldiers who expressed their intentions to make a career of the Army and those who would recommend their MOS to someone else would probably be more strongly motivated to do well on the SQT. It was also assumed that those who said that the SQT was important tried harder to do well. But when SQT scores were analyzed in relation to soldiers' answers to these questions, no relationship was found. The absence of an association between SQT scores and soldier motivation as measured here was unexpected. It may be that our questions simply did not reflect soldier motivation. But another explanation, and in our opinion, a more plausible one, has to do with the experience of taking a test. For most people in our society, taking a test is a stressful situation in which one tries to do their best. We suspect that this also is true of soldiers taking an SQT. Thus, differences in motivation, such as our questions were designed to probe, are overwhelmed and washed out in the test situation itself.

This suggests that differences in motivation impact on test scores, if at all, through prior efforts to prepare for the test. But among skill level one soldiers, training for the SQT seems not as much a matter of individual motivation as of unit emphasis. Two indices of unit training are the timely delivery of SQT Notices to soldiers and the amount of training for the SQT. Both of these indices are positively correlated with the SQT scores as shown in Table 5.

(Table 5 About Here)

The SQT Notice informs soldiers on just what tasks are to be tested on the SQT. The correlations between training time and SQT scores may seem surprisingly

low. But an important element here is the selectivity in training soldiers for the SQT. The training, at least in many instances, is based upon diagnostic information about soldier performance. Those soldiers who are identified as nonperformers of a task tend to get the most training.

Summary and Conclusions

In summary, the major results of this analysis are as follows:

1. The readability of the ten SQT included in this study generally match the reading ability in the target soldier population. Thus, readability would not seem to be a serious source of invalidity in SQT.

2. However, soldier reading ability and SQT readability are important factors in SQT performance. Evidence for this conclusion comes from reviews of SQT by outside experts, from soldier responses indicating difficulty in understanding the skill component of the SQT, and correlations of AFQT and SQT scores.

3. Individual soldier motivation as expressed in military career intentions, attitudes toward the MOS, and opinions about the importance of the SQT was not shown to be related to SQT scores.

4. Unit emphasis on the SQT as reflected in the early delivery of the SQT Notice and training of soldiers was related to SQT scores.

5. With respect to the question of major interest here, the findings are negative. This question concerned the association between soldier reading ability and SQT performance, as the association might be modified by other factors. There is evidence that SQT scores are associated with reading ability. But our data did not give evidence that this association is modified by soldier motivation or unit emphasis on the SQT.

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Mathews, J. J., Valentine, L. E. Jr., & Selman, W. S. Prediction of Reading Grade Levels of Service Applicants from Armed Services Vocational Aptitude Battery (ASVAB). Air Force Human Relations Laboratory, Technical Report No. 78-82. December 1978.

TABLE 1

SQT SELECTED FOR ANALYSIS

SQT	JOB TITLE	PROPONENT SCHOOL
11H	HV ANTIARMOR WPN CRWMN	INF
12C	BRIDGE CRWMN	EN
13B	CANNON CRWMN	FA
16P	SHT RGE MSL CRWMN	AD
19E	M48/M60 ARM CRWMN	AR
31M	MULTI-CHAN COMM EQ OP	SIG
55B	AMMO SP	MMCS
67N	UTIL HEL REP	TRANS
71L	ADMIN SP	SSC
76X	SUBSIST SUP SP	QM

Table 2

MATCH OF SQT READABILITY WITH

SOLDIER READING ABILITY

MOS	SQT READING GRADE LEVELS	SOLDIER READING GRADE LEVELS
11H	6	9
12C	5	8
13B	6	8
16P	8	8
19E	6	8
31M	7	8
55B	9	8
67N	8	10
71L	8	11
76X	9	8

Table 3

CORRELATION OF REPORTED DIFFICULTY WITH SOLDIER SCORES ON THE WRITTEN PORTION OF THE SQT

MOS	CORRELATION WITH SC SCORES*
11H	-.30
12C	-.34
13B	-.39
16P	-.04
19E	-.09
31M	-.02
55B	-.18
67N	-.19
71L	0.00

*Negative correlations indicate that some difficulty resulted in lower scores.

TABLE 4

CORRELATIONS OF SQT SCORES WITH AFQT SCORES

MOS	N	SQT SCORES	SC SCORES
11H	31	.43*	.41*
12C	12	.26	.47
13B	27	.42*	.39*
16P	22	.22	.32
19E	55	.22	.37*
31M	17	.48*	.41*
55B	27	.30	.25
67N	46	.22	.21
71L	27	.31	.35*

*STATISTICALLY SIGNIFICANT

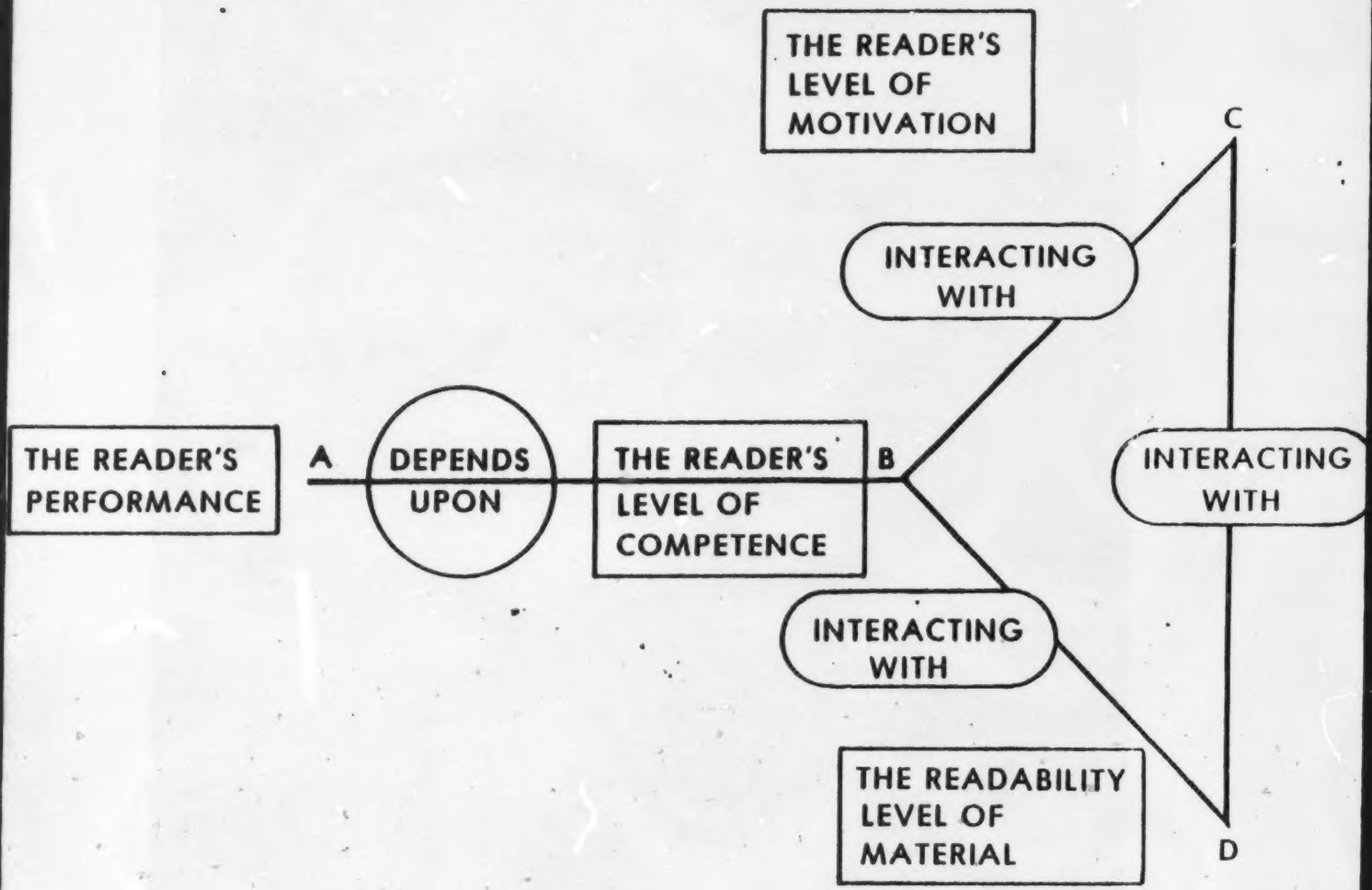
Table 5

CORRELATION OF SQT SCORES WITH NUMBER OF WEEKS SOLDIERS HAD SQT NOTICE AND NUMBER OF HOURS SPENT TRAINING

MOS	SQT NOTICE	TRAINING TIME
11H	.43*	.40*
12C	.61*	.21
13B	.24	.28*
16P	-.06	.25*
19E	.28*	.09
31M	.15	.13
55B	.40*	.22
67N	.15	-.02
71L	.14	.26
76X	Insufficient Data	.21

*Significant at .05 level

FIGURE 1


THE READER'S LEVEL OF MOTIVATION
C
INTERACTING WITH
THE READER'S PERFORMANCE
A
DEPENDS UPON
THE READER'S LEVEL OF COMPETENCE
B
INTERACTING WITH
INTERACTING WITH
THE READABILITY LEVEL OF MATERIAL
D